

Contents

List of contributors	vii
Part I Introduction	1
1 Soliton theory: a brief synopsis <i>A. P. Fordy</i>	3
Part II Solution method	23
2 Spectral transforms <i>P. J. Caudrey</i>	25
3 Two-dimensional spectral transforms <i>P. J. Caudrey</i>	55
4 Hirota's method <i>J. J. C. Nimmo</i>	75
5 Bäcklund transformations in soliton theory <i>C. Rogers</i>	97
Part III Physical applications	131
6 Why the NLS equation is simultaneously a success, a mediocrity and a failure in the theory of nonlinear waves <i>J. D. Gibbon</i>	133
7 The generation and propagation of internal solitons in the Andaman Sea <i>A. R. Osborne</i>	152
8 General relativity <i>R. K. Dodd</i>	174
9 Soliton models of protein dynamics <i>P. S. Lomdahl</i>	208
Part IV Hamiltonian theory	233
10 Hamiltonian structures and complete integrability in analytical mechanics <i>S. Wojciechowski</i>	235
11 Hamiltonian structure of nonlinear evolution equations <i>M. Antonowicz and A. P. Fordy</i>	273

Part V Algebraic and geometric structures	313
12 Integrable equations associated with simple Lie algebras and symmetric spaces <i>A. P. Fordy</i>	315
13 Infinite-dimensional Lie algebras of hidden symmetries of soliton equations <i>T. Miwa</i>	338
14 Algebraic-geometry methods in soliton theory <i>P. G. Grinevich and I. M. Krichever</i>	354
Part VI Testing for complete integrability	401
15 Prolongation structures of nonlinear evolution equations <i>A. P. Fordy</i>	403
16 Painlevé property for partial differential equations <i>M. Tabor</i>	427
Index	447